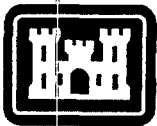

**Streambank Protection Project
Mill Brook
Brownsville, Vermont**

Operation and Maintenance Manual

October 1988



**US Army Corps
of Engineers**
New England Division

**OPERATION AND MAINTENANCE MANUAL
EMERGENCY STREAMBANK PROTECTION PROJECT
MILL BROOK
BROWNSVILLE, VERMONT**

FOREWORD

The Brownsville streambank protection project, consisting of concrete grid blocks, was designed and constructed to stabilize the streambank along the Mill Brook behind the Gleanor Grange Hall. The successful functioning of the streambank stabilization works is not assured solely by the construction of the concrete grid blocks along the streambank since the forces of nature, in this case, high velocity flows and ice jams will continue to attack the streambank. If the system is to perform the functions for which it was designed, it must be carefully maintained not only during periods of normal flow stages, but also during subsequent flood periods.

The purpose of this manual is to provide information regarding actual maintenance procedures and outline the responsibilities of the parties involved. In general, the regulations designate non-Federal interests as having responsibility for operation and maintenance of the project. Therefore, the town of West Windsor should assure that several local individuals be familiar with this project and have a thorough understanding of the recommended methods of maintaining the system.

The general flood control Regulations for Operation and Maintenance of Flood Control Works quoted herein were approved by the acting Secretary of War on August 9, 1944. Established by the Department of Defense, the improvement of rivers and harbors and other waterways for flood control and other purposes, formerly under jurisdiction of the Secretary of War, became the responsibility of the Secretary of the Army. References herein to the Secretary of War and War Department shall be construed to mean, respectively, the Secretary of the Army and the Department of the Army. Where reference is made to the District Engineer in the Regulations included in this manual, it shall be construed to mean the Division Engineer, New England Division, Corps of Engineers.

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SECTION I

INTRODUCTION

1. AUTHORIZATION

The construction of the streambank stabilization project along Mill Brook in the village of Brownsville, Vermont, was authorized by the Chief of Engineers on July 23, 1986, pursuant to the authority contained in Section 14 of the 1946 Flood Control Act, as amended.

2. LOCATION

The village of Brownsville is located in the town of West Windsor, Vermont, about 12 miles north of Springfield, Vermont. The project site is located 150 feet upstream of the junction of Beaver and Mill Brooks and is situated along the north bank of Mill Brook adjacent to the Gleanor Grange Hall.

3. DESCRIPTION OF DAMAGE

The problem area involved streambank erosion along Mill Brook which had threatened to destroy the Gleanor Grange Hall in West Windsor's Historical District. Erosion along the banks of Mill Brook had brought the top the bank to within 13 feet of the foundation of the Gleanor Grange Hall and within 5 feet of its fire escape. The progressively eroding bank would have undermined several large trees and eventually the hall.

4. DESCRIPTION OF PROJECT

The streambank stabilization project consists of interlocking concrete grid blocks placed along 120 feet of eroding bank adjacent to the Gleanor Grange Hall. The grid blocks are 6 inches thick and are placed over a 1-foot layer of gravel bedding and a layer of filter fabric, constructed on a slope of 1 vertical to 1.5 horizontal. The toe of the grid blocks extend 5 feet below the streambed and are backfilled with stone protection. The voids in the interlocking grid blocks are filled with topsoil and seeded. The project also consists of 6 to 8 boulders, about 4 feet in diameter, placed in the brook for fishery habitat.

5. PROTECTION PROVIDED

The streambank stabilization was designed and constructed to maintain the integrity of the Gleanor Grange Hall and its surrounding grounds.

6. CONSTRUCTION HISTORY

The project was constructed by the Acadia Landscape Construction Corporation of Burlington, Vermont during the period from June 18, 1987 to October 1, 1987 at a cost of \$ 57,000.

7. ASSURANCES OF LOCAL COOPERATION

The Army Corps of Engineers and the State of Vermont entered into a local cooperation agreement for this streambank stabilization project on August 24, 1986. The State, in turn, entered into a mirror agreement with the town of West Windsor. The agreement provides for the local sponsor to, among other required responsibilities, maintain the project after its completion without cost to the Federal Government. A copy of the formalized local assurances is included as Appendix B.

8. PLANS

A reduced size drawing showing the project as actually constructed is included as Appendix D.

SECTION II

GENERAL REGULATIONS

9. PURPOSE OF THIS MANUAL

The purpose of this manual is to present detailed information to be used as a guide in complying with "Flood Control Regulations - Maintenance and Operation of Flood Control Works" as approved by the Acting Secretary of War on August 9, 1944, and published in this volume as Appendix A. In executing assurances of local cooperation, the town of West Windsor has agreed to maintain and operate the completed works in accordance with these regulations. The regulations which are intended to cover all local protection projects constructed by the Department of the Army throughout the United States are general in nature, and obviously cannot give detailed instructions for the maintenance and operation of a specific project. The details set forth in this manual for maintenance and operation for the town of Brownsville project are intended to supplement the regulations to permit obtaining all the benefits and protection against erosion for which the project was designed. Failure to maintain and operate the project as required by the regulations and as detailed herein could cause property losses and could result in an irreparable loss of confidence in the bank protection system.

10. GENERAL RULES AND REGULATIONS

Paragraph 208.10 (a) of the regulations prescribed by the Secretary of War gives general rules for the maintenance and operation of structures and facilities constructed by the United States for local protection. Applicable portions are quoted below to avoid the necessity for cross reference and are further defined by remarks under each quotation.

"(1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits;"

These requirements cannot be overstressed, and the town authorities must make adequate provisions for funds, personnel, equipment and materials to allow for the proper maintenance and operation of the streambank protective works.

"(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with the regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent", who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States;"

The committee should be composed of competent members, preferably persons

experienced in engineering or construction works. The committee must be given broad authority to carry out its responsibilities. The name, address and office and home telephone numbers of the Superintendent, and any changes thereof, shall be promptly furnished to the Division Engineer, New England Division, Corps of Engineers.

(3) N/A

"(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the right-of-ways for the protective facilities;"

Right-of-ways and easements have been established for which access to the project can be provided in order to allow equipment which may be necessary to perform the maintenance of the project. These right-of-ways are essential and must be kept open at all times.

"(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-ways, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work;"

Any contemplated improvements or alterations as outlined above must be submitted to the U.S. Army Corps of Engineers, New England Division, Waltham, Massachusetts, and the approval of the Division Engineer obtained prior to the town authorizing the work. All requests for approval shall be in writing and complete drawings in duplicate. One set, which shall be in reproducible form, must be submitted along with a full description of the work intended. The town will be held responsible for obtaining prior approval from the Corps of Engineers for any improvements or alterations proposed by itself, private parties or any public parties. The town shall furnish the Division Engineer as-built drawings, in duplicate, of the completed work.

"(6) It shall be the duty of the Superintendent to submit a semi-annual report to the District Engineer covering inspection, maintenance, and operation of the protective works;"

See paragraph 13 of this SECTION for instructions on submitting reports.

"(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works;"

The Division Engineer or his representatives will make periodic inspections of the protective works to determine if the project is being properly maintained and operated by the town.

"(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made;"

The town should maintain the facilities and keep them in good repair and not wait for the Division Engineer to call such matters to its attention. Upon request, the Division office will advise the town how to make any major repairs to the facilities.

"(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods;"

The project is designed to provide bank stabilization and to protect the Gleanor Grange Hall against structural failure. It does not provide protection against flooding and therefore, it may be necessary to curtail uses during periods of flooding.

"(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations;"

The flood control committee should familiarize itself with the contents of this manual. The town authorities are encouraged to call on the Division Office of the Corps of Engineers for any additional advice or instructions required by them in carrying out the town's obligations for maintaining and operating the protection facilities.

11. MAINTENANCE

a. The word "maintenance" as used in this manual applies to the upkeep, repair, replacement and care of the work constructed by the United States and turned over to the town. If the maintenance is neglected there will be deterioration and possible structural failure in flood time.

b. Maintenance includes a regular walking inspection over the entire system. The purpose of the inspection is to detect any deterioration of project features that indicates a need for repair or replacement, and also to detect any restrictions in the stream, channel or floodway that reduces flow capacity.

12. OPERATION

a. The term "operation" as used in this manual, refers to the actual functions of the various features of the protection works during abnormal river stages.

b. When abnormal river stages are expected, it is important that the Superintendent make immediate decisions, take prompt action and has the authority to carry out his

decisions to insure proper continued operation of the concrete grid blocks and stone protection works.

c. To insure correct operation, the following items are considered to be essential:

(1) At least one person (preferably 2 or 3) be familiar with the protection works including the various types of materials comprising the streambank protection works.

(2) The sources of these materials should be established ahead of time. If possible a small amount of each type of material should be stockpiled nearby for quick use. The town should maintain the reserve supply of replacement blocks that remained following construction.

(3) Sufficient loading, hauling and placing equipment should be readily available for providing and placing the repair materials.

(4) Sufficient experienced personnel should be readily available for inspecting and performing the repair work.

13. REPORTS

a. The regulations prescribed by the Secretary of the Army call for semi-annual reports to be submitted by the Superintendent to the Division Engineer covering inspection and maintenance. Inspection of the protective facilities shall be made immediately prior to flood seasons, immediately following floods, and otherwise at intervals not exceeding 90 days as required by regulations.

b. To assist the Superintendent in making his inspection, a sample form is included in Appendix C. The Superintendent shall have additional copies printed for use in submitting his reports.

c. The semi-annual reports shall be submitted in triplicate to the Division Engineer each May and November. The reports will be submitted in letter form with copies of the inspection forms covering the inspections made during the period of the reports. The reports shall cover the following points:

(1) A description of the maintenance work performed in the preceding six months.

(2) The number and classification of men working on maintenance, regularly and intermittently.

(3) Description of any work performed by contract on the repair or improvements of the project.

SECTION III

STREAMBANK PROTECTION WORK

14. DESCRIPTION

The streambank stabilization work consists of construction of 120 feet of concrete grid blocks and stone protection along the bank of Mill Brook adjacent to the Gleanor Grange Hall.

15. MAINTENANCE

Paragraph 208.10(g) (1) of the prescribed regulations sets forth rules for the maintenance of channels and floodways. These rules are quoted below, followed by brief comments where applicable to clarify these rules as they apply to the project.

"Channels and Floodways. - (1) Maintenance. - Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:"

"(i) The channel or floodway is clear of debris, weeds and wild growth;"

All debris and vegetative growth except grasses, at the protective works shall be removed promptly. Failure to remove shrub and tree growth could eventually lead to structural damage to the slope and grid blocks from the root systems.

"(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;"

Dumping of waste materials or any types of encroachment on the protective work shall be prohibited and prompt steps shall be taken to remove or have removed any such encroachments.

"(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;"

Shoal areas should be removed, but care should be exercised that slopes of the channel and existing banks are not undercut or damaged. Existence of shoal areas will be apparent from inspections during time of low flow.

"(iv) Banks are not being damaged by rain or wave wash and that no sloughing of banks has occurred;"

Banks shall be inspected for damage by rain or wave wash or by sloughing and repaired promptly using materials similar to that used in their original construction. Inspections shall be made at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections.

"(v) Riprap sections are in good condition;"

The concrete grid blocks and stone toe protection must be maintained in good condition to resist erosion. Any damage to the grid blocks or loss of stone due to slides or vandalism must be promptly corrected. Periodic checks should be made of the grid blocks and stone toe protection to detect movement, damage or losses; and prompt corrective action should be taken. Such inspection shall be made at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections.

(vi) N/A

16. OPERATION

Paragraph 208.10(g) (2) of the prescribed regulations gives rules for operation of channel and floodways. These rules are paraphrased below with regard to the project.

(1) Operation. The bank of the stream along the project area shall be inspected during periods of high water and measures taken to protect those reaches being attacked by the current. The project shall be thoroughly inspected immediately following each major high water period (Level of protection - Elevation 672.5 feet National Geodetic Vertical Datum). As soon as practicable thereafter, all snags and other debris shall be removed and all damage to the grid blocks and stone toe protection shall be repaired.

(2) Operations Restrictions. Repair work may be accomplished from the top of the bank or streambed as appropriate. Heavy equipment must be kept off the slope to avoid damage to the grid blocks. Any operation and maintenance activities should avoid damage to the trees on the top of the bank behind the Gleanor Grange Hall.

APPENDIX A

REGULATIONS PRESCRIBED
BY THE
SECRETARY OF THE ARMY

TITLE 33-NAVIGATION AND NAVIGABLE WATERS

Chapter II-Corps of Engineers War Department-Part 208-Flood Control Regulations Maintenance and Operation of Flood Control Works

(Retyped verbatim from
original document)

Pursuant to the provisions of Section 3 of the Act of Congress approved June 22, 1936, as amended and supplemented (49 Stat. 1571; 50 Stat. 877; and 55 Stat. 638; 33 U.S.C. 701c; 701c-1), the following regulations are hereby prescribed to govern the maintenance and operation of flood control works:

208.10 Local flood protection works; maintenance and operation of structures and facilities- (a) *General.*

(1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with the regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent", who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities.

(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District

Engineer of the War Department or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice.

Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval.

Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

(6) It shall be the duty of the Superintendent to submit a semi-annual report to the District Engineer covering inspection, maintenance, and operation of the protective works.

(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations.

(b) *Levees - (1) Maintenance.* The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable

growth areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and further, to be certain that:

(i) No unusual settlement, sloughing, or material loss of grade or levee cross-section has taken place;

(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(iii) No seepage, saturated areas, or sand boils are occurring;

(iv) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(v) Drains through the levees and gates on said drafters are in good working condition;

(vi) No revetment work or riprap has been displaced, washed out, or removed;

(vii) No action is being taken, such as burning grass and weeds during appropriate seasons, which will retard or destroy the growth of the sod;

(viii) Access roads to and on the levee are being properly maintained;

(ix) Cattle guards and gates are in good condition;

(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

(xi) There is no unauthorized grazing or vehicular traffic on the levees;

(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days, and such immediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent.

(2) *Operation.* During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(i) There are no indications of slides or sloughs developing;

(ii) Wave wash or scouring action is not occurring;

(iii) No low reaches of levee exist which may be overtopped;

(iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability to adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

(c) *Flood walls - (1) Maintenance.* Periodic inspections shall be made by Superintendent to be certain that:

(i) No seepage, saturated areas, or sand boils are occurring;

(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

(iii) No trees exist, the roots of which might extend under the wall & offer accelerated seepage paths;

(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

(viii) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice.

(2) *Operation.* Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect

the concrete and construction joints. Immediate steps shall be taken to correct any conditions which endanger the stability of the wall.

(d) *Drainage structures - (1) Maintenance.* Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(i) Pipes, gates, operating mechanisms, riprap, and headwalls are in good condition;

(ii) Inlet and outlet channels are open;

(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures in that no fires are being built near bituminous coated pipes;

(iv) Erosion is not occurring adjacent to the structures which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

(2) *Operation.* Whenever high water conditions impede, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures and levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse conditions.

(e) *Closure structures - (1) Maintenance.* Closure structures for the traffic openings shall be inspected by the Superintendent every 90 days to be certain that:

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

(iii) All moveable parts are in satisfactory working order;

(iv) Proper closure can be made promptly when necessary;

(v) Sufficient materials are on hand for the erection of sandbag closures and that the location of such materials will be readily accessible in times of emergencies.

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each three-year period. Trial erections of all closure structures shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substitute therefore. Trial erection of sandbag closures is not required. Closure materials will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replaced immediately.

(2) *Operation.* Erection of each moveable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for the ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

(f) *Pumping plants -*

(1) *Maintenance.* Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubri-

cants for all types of machine, fuel for gasoline or diesel powered equipment, and flashlights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subject to undue dampness and otherwise at intervals not to exceed one-year period. A record shall be kept showing the results of such test period. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be properly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their service ability in times and emergencies. Only skilled electricians and mechanics shall be employed on test and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be repaired or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

(2) *Operation.* Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above hyphenated mentioned "Operation Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pumphouse sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished to the District Engineer following each flood.

(g) *Channels and Floodways -*

(1) *Maintenance.* Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

(i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste material, building of unauthorized structures or encroachments;

(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;

(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

(v) Riprap sections and deflection dikes and walls are in good condition;

(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

(2) *Operations.* Both banks of the channel shall be patrolled during periods of high waters and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to the banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired.

(h) *Miscellaneous Facilities - (1) Maintenance.* Miscellaneous structures and facilities constructed as part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspect-

ed by the Superintendent and the appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior runoff during flood period shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where applicable, shall provide temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefore.

(49 Stat. 1571, 50 Stat. 877; and 55 Stat. 638; 33 U.S.C. 701c; 701c-1)
(Regs. 9 August 1944, CE SPEWF)

[SEAL] J.A. ULIO

Major General

The Adjutant General

[F.R. Doc 44-12255; Filed,
August 16, 1944; 9:44 a.m.]

APPENDIX B

ASSURANCES OF LOCAL COOPERATION

AGREEMENT BETWEEN
THE UNITED STATES OF AMERICA
AND
THE STATE OF VERMONT
FOR LOCAL COOPERATION
AT BROWNSVILLE
EMERGENCY STREAMBANK PROTECTION PROJECT
MILL BROOK
WEST WINDSOR, VERMONT

THIS AGREEMENT entered into this 29th day of
August , 1986 by and between the UNITED STATES OF
AMERICA (hereinafter called the "Government"), represented by
the Contracting Officer executing this Agreement, and the
STATE OF VERMONT (hereinafter called the "State"), acting
by and through its Department of Water Resources and
Environmental Engineering, with the approval of the
Governor, WITNESSETH THAT:

WHEREAS, construction of the Brownsville emergency
streambank protection project along Mill Brook at the Gleanor
Grange Hall in West Windsor, Vermont, consisting of the
construction of about 120 linear feet of concrete grid block
slope protection along the eroding Mill Brook streambank
(hereinafter called the "Project"), was approved by the Chief
of Engineers on 23 July 1986, under authority granted by
Section 14 of the 1946 Flood Control Act, Public Law 79-526

Resources Development Act of 1974, Public Law 93-251, approved 7 March 1974; and

WHEREAS, the State hereby represents that it has the authority and capability to furnish the non-Federal cooperation required by the Federal legislation authorizing the project and by other applicable law.

NOW, THEREFORE, the parties agree as follows:

1. The State agrees that if the Government shall commence construction of the emergency streambank protection project along Mill Brook in West Windsor, Vermont, substantially in accordance with the approval of the Chief of Engineers under authority of Section 14 of the 1946 Flood Control Act, Public Law 79-526, as amended, the State shall in consideration of the Government commencing construction of such project fulfill the requirements of non-Federal cooperation specified in such legislation, to wit:

a. Provide, without cost to the Government, all lands, easements, rights-of-way and utility relocations necessary for project construction.

b. Hold and save the Government free from damages due to the construction, operation and maintenance of the project except where such damages are due to the fault or negligence of the Government or its contractors.

c. Maintain and operate the project after its completion without cost to the Government in accordance with regulations prescribed by the Secretary of the Army. Annual

operation and maintenance costs are currently estimated to be \$500.00.

d. Assume full responsibility for all costs in excess of the Federal statutory cost limitation of \$250,000.00 to insure a complete, useful improvement. The Federal cost limitation includes costs of all investigation, planning, engineering, supervision, inspection and administration involved in development and construction. Current federal costs are estimated at \$72,000.00.

e. Prevent future encroachment which might interfere with proper functioning of the project.

f. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352, 78 Stat. 241) to the end that no person shall be excluded from participation in, denied the benefits of or subjected to discrimination in connection with the project on the grounds of race, creed, or national origin.

g. Comply with the requirements of non-Federal cooperation specified in Sections 210 and 305 of Public Law 91-646, approved 2 January 1971, entitled "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970".

2. The State hereby gives the Government a right to enter upon, at reasonable times and in a reasonable manner,

lands which the State owns or controls, for access to the project for the purpose of inspection. If inspection shows that the State for any reason is failing to operate, repair, manage or maintain the project in accordance with the assurances hereunder and has persisted in such failure after a reasonable notice in writing by the Government delivered to State officials, then the Government may enter upon said lands to operate, repair, manage and/or maintain the project and bill the State for costs incurred. No operation, repair, management or maintenance by the Government in such event shall operate to relieve the State of responsibility to meet its obligations as set forth in paragraph 1 of this agreement, or to preclude the Government from pursuing any other remedy at law or equity.


IN WITNESS WHEREOF, the parties hereto have executed
this contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

THE STATE OF VERMONT

By: 

THOMAS A. RHEN
Colonel, Corps of Engineers
Division Engineer
Contracting Officer

By: 

JONATHAN LASH
Commissioner
Department of Water
Resources and Environ-
mental Engineering

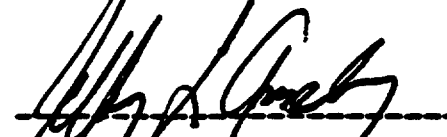
Date: 29 August 1986

APPROVED:



MADELEINE M. KUNIN
Governor

APPROVED:



JEFFREY L. AMESTOY
Attorney General

CERTIFICATE OF AUTHORITY

I, Frederic L. Amesbury, do hereby certify that I am the Attorney General of the State of Vermont; that the Department of Water Resources and Environmental Engineering is a legally constituted public body with full authority and legal capability to perform the terms of the agreement between the United States of America and the State of Vermont in connection with the Local Cooperation Agreement for the emergency streambank protection project on the Mill Brook in West Windsor, Vermont, and to pay damages, if necessary, in the event of the failure to perform in accordance with Section 221 of Public Law 91-611; and that the person who has executed the contract on behalf of the State of Vermont has acted within his statutory authority.

IN WITNESS WHEREOF, I have made and executed this certificate this 24th day of August, 1973.

Frederic L. Amesbury
Attorney General of the
State of Vermont

CERTIFICATION

I. Paul Sgellas, certify that I am Secretary of the State of Vermont; that Jonathan Lash, who signed this Agreement on behalf of the State, is the Commissioner of the Department of Water Resources and Environmental Engineering; and that said agreement was duly signed for and on behalf of the State and is within its statutory powers.

I further certify that Madeleine M. Kunin was the Governor of the State of Vermont and Jeffrey L. Amestoy the Attorney General on the date of the respective approvals of said agreement.

IN WITNESS WHEREOF, I have hereunto affixed my hand and seal of the State of Vermont.

Paul Sgellas
Secretary of State

APPENDIX C

INSPECTION REPORT FORMS

DESIGNATION OF SUPERINTENDENT

Name Of Project: _____

Location: _____

MAINTAINING MUNICIPAL AGENCY:

Agency: _____

Address: _____ Tel. No. _____

"SUPERINTENDENT" - as required by Section 208.10 (a) (2), Chap II,
Title 33 USC

Name & Title: _____

Employed by: _____

Business Address: _____

Business Tel. No: _____

Nights, Sundays, Address: _____

Nights, Sundays, Tel. No: _____

Remarks:

Signed _____

Title: _____

Date: _____

NOTE: To be submitted and updated as necessary by the responsible agency which will maintain and operate the works in accordance with regulations prescribed by the Secretary of the Army as required by law (Title 33, Chap. 208, Sec II, USC).

LOCAL FLOOD PROTECTION PROJECT INSPECTION REPORT

Project:

Maintaining Agency:

Type Inspection: _____ Semi-Annual Staff _____ 90 Day Interim

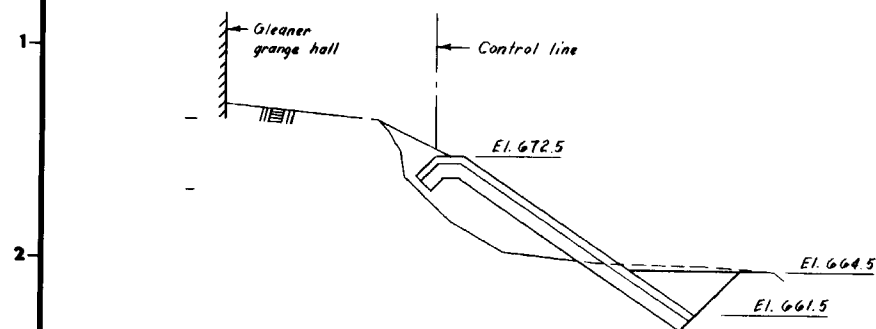
River Basin: _____ **Date of Inspection** _____

Feature	Sat	Unsat	Deficiencies
PUMPING STATIONS - STRUCTURES			
INTERIOR			
EXTERIOR			
PUMPS - MOTORS - ENGINES			
TRIAL OPERATED			
GENERAL CONDITION			
POWER SOURCE			
INSULATION TESTS			
METAL INTAKES/OUTLETS			
GATE VALVES			
GATES - DRAINAGE STRUCTURES			
TRIAL OPERATED			
GENERAL CONDITION			
LUBRICATION			
GENERAL CONDITION			
SLOPES/EROSION			
SAND BOILS/CAVING			
TRESPASSING			
SLOPE PROTECTION			
DRAINS			
STOP-LOGS - LOG BOOM			
CONDITION OF LOGS			
AVAILABILITY OF LOGS			
HIGHWAY SLOTS			
STORAGE FACILITIES			
CHANNELS - OUTLET WORKS CHANNEL			
BANKS			
OBSTRUCTION CONTROL			

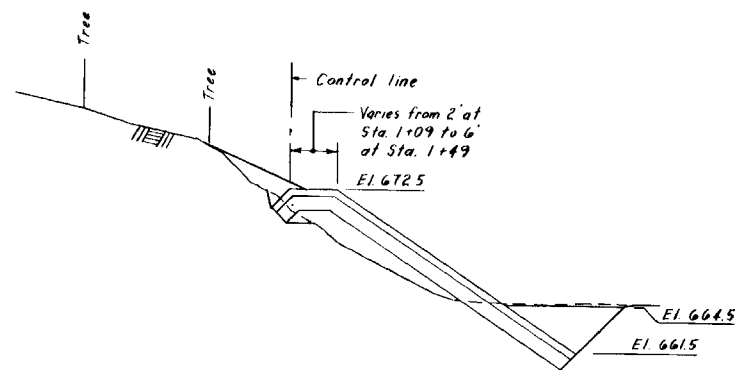
Feature	Sat	Unsat	Deficiencies
CONCRETE STRUCTURES			
SURFACE			
SETTLEMENT			
JOINTS			
DRAINS			
MISCELLANEOUS			
EMERGENCY OPER. PLAN			
EMERGENCY EQUIPMENT			
SEMI-ANNUAL REPORT			
Inspection Party: Photographs Taken: Remarks & Additional Comments: (Indicate Here Observations, Discussions, Specific Feature Deficiencies, Recommendations and any other pertinent information. Use Continuation Sheet if necessary.)			
X ALL APPLICABLE ITEMS. IF UNSAT INDICATE SPECIFIC DEFICIENCIES. INDICATE IF NOT APPLICABLE.			
DATE	INSPECTED BY: TYPED NAME & TITLE		SIGNATURE

APPENDIX D

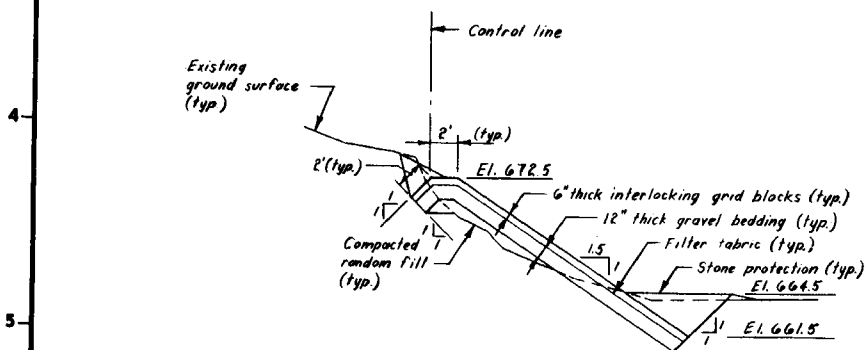
AS-BUILT DRAWINGS



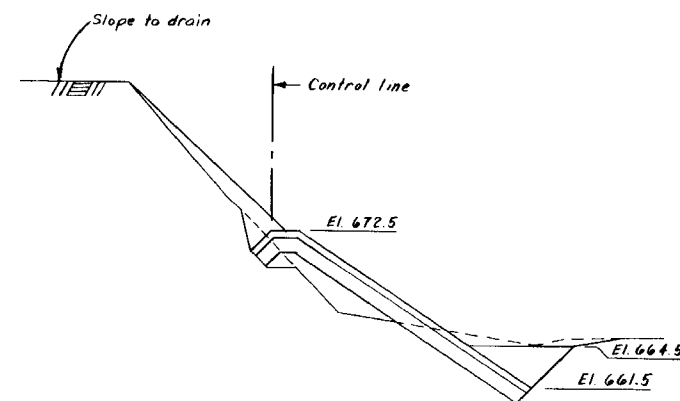
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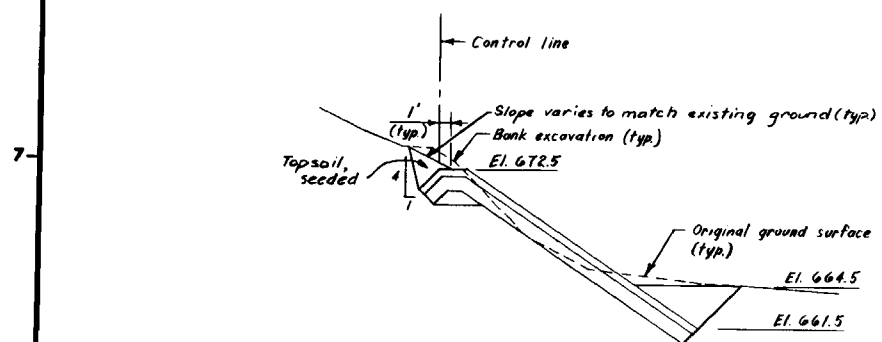
STATION 1+28



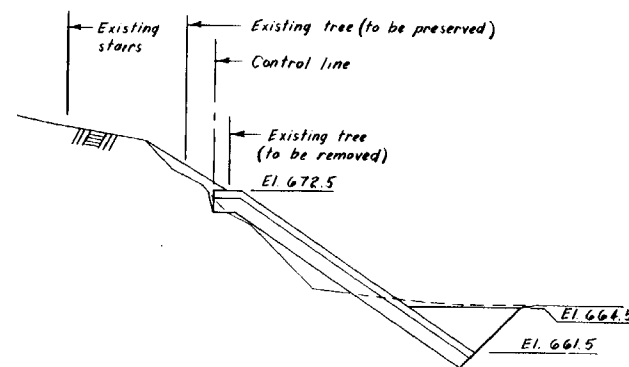
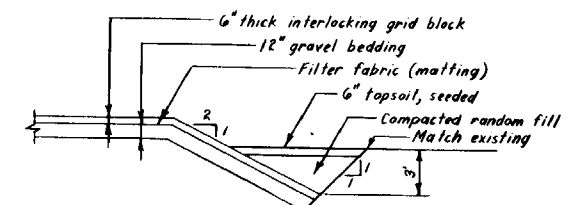
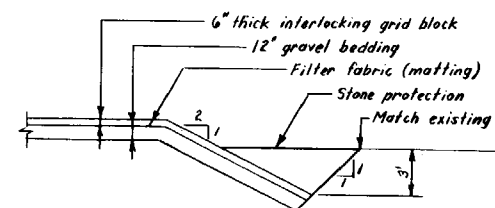
STATION 0+44



STATION 1+09

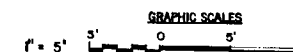


STATION 0+33

STATION 0+92
TYPICAL STA. 0+89 TO STA. 0+95END SECTION ABOVE EL. 669.0
SCALE: 1" = 5'END SECTION BELOW EL. 669.0
SCALE: 1" = 5'

As Built Drawing

Contract No. DACW 33-86-C-0043



3-18-88 Final field corrections		DATE	DESCRIPTION	BY
DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS WALTHAM, MASS.				
WATER RESOURCES DEVELOPMENT PROJECT BROWNSVILLE, VERMONT EMERGENCY STREAMBANK PROTECTION MILL BROOK SECTIONS				
DES. BY P.S./R.L.S.W.K.	CHKD. BY S.W.K.	DATE JUN. 1986	APPROVED CHIEF, ENGINEERING DIVISION	
DRAWING NUMBER BRO-1		SHEET 2		